

## CLAIMS

What is claimed is:

- 1 1. A light emitting diode device, comprising:
  - 2 a plurality of light emitting diodes connected together in series;
  - 3 a plurality of parallel elements connected in parallel with the plurality of light
  - 4 emitting diodes;
  - 5 a current monitor connected with the plurality of light emitting diodes that
  - 6 measures an amount of current flowing from the plurality of light emitting diodes and
  - 7 generates a current flow signal; and
  - 8 a voltage converter that supplies a current to the plurality of light emitting
  - 9 diodes as a function of the current flow signal and a commanded current signal.
- 1 2. The device of claim 1, wherein the commanded current signal comprises a
  - 2 direct current signal.
- 1 3. The device of claim 1, wherein the commanded current signal comprises a
  - 2 pulse width modulated signal.
- 1 4. The device of claim 3, wherein the commanded current signal is generated
  - 2 by a microprocessor.
- 1 5. The device of claim 1, wherein the plurality of parallel elements comprises
  - 2 a plurality of zener diodes.

1 6. The device of claim 1, wherein a parallel element is connected in parallel  
2 with a light emitting diode.

1 7. The device of claim 1, wherein a parallel element is connected in parallel  
2 with multiple light emitting diodes.

1 8. The device of claim 1, further comprising:  
2 a temperature sensor that measures a temperature associated with at least  
3 one of the plurality of light emitting diodes and generates a temperature signal.

1 9. The device of claim 8, further comprising:  
2 a temperature derating circuit that reduces the current to the plurality of  
3 light emitting diodes the temperature signal exceeds a temperature threshold.

1 10. The device of claim 9, wherein the temperature derating circuit adjusts the  
2 commanded current signal such that the voltage converter supplies less current to  
3 the plurality of light emitting diodes.

1 11. The device of claim 9, wherein the temperature sensor measures a solder  
2 temperature near a light emitting diode.

1 12. The device of claim 11, wherein the linear temperature sensor comprises a  
2 temperature dependant resistor.

1 13. The device of claim 12, wherein a terminal of the temperature dependant  
2 resistor and a cathode terminal of a light emitting diode are thermally interconnected.

1 14. The device of claim 9, wherein the temperature derating circuit comprises a  
2 microprocessor.

1 15. The device of claim 14, wherein the temperature derating circuit provides a  
2 signal to the voltage converter as a function of a measured temperature and a  
3 temperature correction factor table.

1 16. The device of claim 8, further comprising:  
2 a temperature compensation circuit that adjusts the current to the plurality  
3 of light emitting diodes as a function of the measured temperature.

4 17. The device of claim 16, the temperature compensation circuit adjusts the  
5 current to the plurality of light emitting diodes such that the plurality of light emitting  
6 diodes have a substantially consistent luminous intensity when the measured  
7 temperature increases.

1 18. The device of claim 1, wherein the light emitting diode control device is a  
2 band limited low electromagnetic interference circuit.

1 19. The device of claim 1, wherein the plurality of parallel elements being  
2 connected in parallel with the plurality of light emitting diodes such that current is

3 routed around a light emitting diode with a failure, where the failure is an open  
4 circuit.

1 20. The device of claim 1, wherein the plurality of light emitting diodes are  
2 adapted to provide back lighting for an active matrix liquid crystal display.

1 21. A display unit adapted for an automotive application, comprising:  
2 a liquid crystal display and;  
3 a backlighting array comprising a plurality of light emitting diodes in a  
4 series configuration and a plurality of parallel elements connected in parallel with the  
5 light emitting diodes such that current is routed around a light emitting diode with a  
6 failure when the failure comprises an open circuit.

1 22. The display unit of claim 21, further comprising:  
2 a temperature derating circuit electrically connected with the backlighting  
3 array, wherein the temperature derating circuit measures a light emitting diode  
4 temperature and reduces a current supplied to the backlighting array if the light  
5 emitting diode temperature exceeds a threshold.

1 23. The display unit of claim 22, further comprising:  
2 a temperature compensation circuit electrically connected with the  
3 backlighting array, wherein the temperature compensation circuit measures a light  
4 emitting diode temperature and adjusts the current supplied to the backlighting array  
5 as a function of the light emitting diode temperature such that the plurality of light

6 emitting diodes have a substantially consistent luminous intensity when the light  
7 emitting diode temperature increases.

1 24. The display unit of claim 23, further comprising:  
2 a microprocessor-based light emitting diode controller that provides a pulse  
3 width modulated signal that controls the intensity of the light emitting diode array.

1 25. A method of controlling a series light emitting diode array, comprising:  
2 monitoring a temperature of the light emitting diode array at a node  
3 connected with a light emitting diode; and  
4 adjusting an input current to the light emitting diode array as a function of  
5 the temperature.

1 26. The method of claim 27, further comprising:  
2 monitoring a current from the light emitting diode array; and  
3 adjusting the input voltage as a function of the current.

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